1997 Cancer in Washington

Annual Report of the
Washington State Cancer Registry

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Office of Community Wellness and Prevention

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Contents

Executive Summary

This annual report of the Washington State Cancer Registry incorporates cancer incidence data for the entire state. It represents the ongoing effort by the Department of Health, the Fred Hutchinson Cancer Research Center, the Blue Mountain Oncology Program, physicians, and cancer registrars throughout Washington. This report is also available on the Department of Health website at **http://www.doh.wa.gov/EHSPHL/Epidemiology/wscr1.htm.**

Cancer is a heterogeneous group of diseases characterized by uncontrolled growth and spread of abnormal cells. The various forms of cancer were responsible for 10,065 deaths among Washington residents in 1997, comprising approximately twenty-five percent of all deaths. In 1997, cancer (all sites combined) was the most common cause of death among adults ages 45 to 74 years and the second leading cause across all age groups. Some form of cancer will likely strike one in three Washingtonians in their lifetime. In 1997, there were 26,517 new cases of cancer diagnosed in Washington.

This report of the Washington State Cancer Registry (WSCR) summarizes information on new cases of cancer (incidence) and death due to cancer (mortality) for Washington state residents. The report provides information on cancer of all sites combined and the 24 cancer sites most frequently diagnosed in Washington residents. This information can be used at the state and county level to identify the burden of morbidity and mortality associated with each type of cancer. This information, combined with information on cancer prevention, early detection, and treatment, is useful for program planning and policy development aimed at reducing the burden of cancer.

The five most common types of cancer reported among Washington residents during 1997 were breast, lung, prostate, colorectal, and melanoma.

1 4,805 new cases and 796 deaths from female breast cancer were reported in 1997. Breast cancer was the second most common cause of cancer mortality for women. Nationally, the incidence rates for breast cancer have been stable during the 1990s. (Wingo et al., 1999) In Washington, however, breast cancer incidence rates seem to be increasing, especially among women in their 50s and 60s. Washington data reflect the national trend of declining death rates for breast cancer. The best strategy for prevention of breast cancer mortality is early detection through screening. In 1997, almost 70% of women in Washington met the recommendations for mammography.

2 3,472 new cases and 590 deaths from prostate cancer were reported for 1997. It was the second leading cause of cancer death among men. Nationally, both incidence and mortality rates for prostate cancer have been decreasing. (Wingo et al., 1999) These trends are also apparent in Washington, although the decrease in prostate cancer incidence seems to have leveled off in more recent years. The reasons for the national decreases are not clear. The recent decrease in national incidence rates may be the result of changes in screening practices in the late 1980s and early 1990s (i.e., the introduction of screening into an unscreened population in the late 1980s followed by a decline in screening in the 1990s). (Wingo et al., 1998) Experts do not agree on the benefits of screening for early detection of prostate cancer.

3 3,426 new cases of lung cancer were reported in 1997. 2,860 Washingtonians died of lung cancer, making it the leading cause of cancer mortality overall for both males and females in that year. Nationally, lung cancer incidence and mortality are decreasing for men and increasing for women. (Wingo et al., 1999) Washington data reflect this pattern for men. The pattern for women reflects the national trend for 1992 to 1995. However, both incidence and mortality rates for lung cancer in women were lower in

1996 and 1997 than in 1995. Additional years of data are needed to determine whether the rates for 1996 and 1997 will continue to be lower than the peak rates seen for women in 1995. Reduction in smoking remains the major focus of efforts to prevent lung cancer.

4 2,811 new cases and 957 deaths from colorectal cancer were reported in 1997. Nationally, incidence and mortality rates for colorectal cancer are decreasing. (Wingo et al., 1999) Changes in screening, treatment, and lifestyle may be contributing to these trends. (Wingo et al., 1998) These trends are evident in Washington. The largest decreases in incidence are among people in their 50s. People 70 years and older are showing the largest decreases in death from colorectal cancer. Regular screening has been shown to reduce mortality. (NCI, 1999) In 1997, approximately one-third of Washington residents met the recommendations for screening. Regular physical activity and a low fat, high fiber diet rich in fruits and vegetables may reduce the risk for colon and rectum cancer. (ACS, 1999) Heavy use of alcohol and smoking may increase the risk of colorectal cancer. (NCI, 1999)

5 1,552 new cases and 176 deaths from melanoma of the skin were reported in 1997. Trends in Washington are similar to national trends. The incidence of melanoma has been increasing, while mortality since 1990 has remained constant. (Wingo et al., 1999) Avoiding sunburn, especially early in life, is effective in reducing incidence of melanoma. (NCI 1999) The ACS recommends routine examination of the skin for reducing mortality from melanoma. (ACS, 1999)

Data in this report are available for three racial groups, including Asians and Pacific Islanders, blacks and whites. The four leading causes of cancer for all three racial groups include cancers of the breast, prostate, lung, and colon and rectum. The fifth most frequently diagnosed cancer is stomach cancer for Asians and Pacific Islanders, non-Hodgkin's lymphoma for blacks, and melanoma for whites.

The breast cancer incidence rate is highest among white women, while the death rate from breast cancer is highest among black women. This phenomenon is seen throughout the United States and speaks to the need for increased outreach for screening and early treatment for black women. Black men in Washington have very high rates of prostate cancer incidence and mortality compared to the other two groups. This finding is consistent with the finding that black men in the United States have the highest rates of prostate cancer in the world. The reason for this is not known.

Although not presented in the Washington data, nationally there are large differences in cancer rates among different groups within the Asian and Pacific Islander racial classification. Length of time in the United States is related to many of these differences. This phenomenon indicates that factors related to lifestyle, such as diet, may influence rates of cancer incidence.

Preface

This annual report of the Washington State Cancer Registry incorporates cancer incidence data for the entire state. It represents the ongoing effort by the Department of Health, the Fred Hutchinson Cancer Research Center, the Blue Mountain Oncology Program, physicians, and cancer registrars throughout Washington. This information is presented in the hope that it will assist health care providers, public health officials, voluntary organizations, and concerned citizens in their efforts to prevent and control cancer in Washington. This report is also available on the Department of Health website at **http://www.doh.wa.gov/ EHSPHL/Epidemiology/wscr1.htm**.

Introduction

Cancer is a heterogeneous group of diseases characterized by uncontrolled growth and spread of abnormal cells. The various forms of cancer were responsible for 10,065 deaths among Washington residents in 1997, comprising approximately twenty-five percent of all deaths. In 1997, cancer (all sites combined) was the most common cause of death among adults ages 45 to 74 years and the second leading cause across all age groups. Some form of cancer will likely strike one in three Washingtonians in their lifetime. In 1997, there were 26,517 new cases of cancer diagnosed in Washington.

Illness and death due to cancer are increasingly preventable through two types of strategies. Primary prevention strategies aim to reduce, usually through lifestyle change, the likelihood that a healthy individual will develop cancer. Alternatively, secondary prevention is accomplished by screening asymptomatic people to diagnose cancers at an early, more readily treatable stage.

This report of the Washington State Cancer Registry (WSCR) summarizes information on new cases of cancer (incidence) and deaths due to cancer (mortality) for Washington state residents and, for comparative purposes, the U.S. The report provides information on cancer of all sites combined and the 24 cancer sites most frequently diagnosed in Washington residents. This information can be used at the state and county level to identify the burden of morbidity and mortality associated with each type of cancer. This information, combined with information on cancer prevention, early detection, and treatment, is useful for program planning and policy development aimed at reducing the burden of cancer.

The Five Most Common Cancer Sites

The most common types of cancer reported among Washington residents during 1997 were breast, lung, prostate, colorectal, and melanoma.

1 4,805 new cases of female breast cancer were reported. Breast cancer is by far the most frequently diagnosed cancer among women. Responsible for 796 deaths in 1997, it was the second most common cause of cancer mortality for women. Nationally, breast cancer incidence increased approximately 1% per year between 1940 and 1980. The increase was higher in the 1980s, reaching 4% per year between 1982 and 1987. This increase is consistent with increased use of mammography during the 1980s. (Wingo et al., 1998) Between 1990 and 1996, the national rate of new breast cancer cases stayed the same. (Wingo et al., 1999) The Washington data between 1992 and 1997 do not seem to be consistent with this national trend. Breast cancer rates rose an average of approximately 2% per year between 1992 and 1997. This increase was statistically significant for women in their 50s and 60s. Nationally, mortality from breast

cancer declined from 1990 - 1996. (Wingo et al., 1999). In Washington, women ages 70 years and older experienced a statistically significant 3.5% decrease in mortality rates between 1992 and 1997. While death rates for women between 40 and 69 year old declined approximately 2% per year, this decrease was not statistically significant. The most likely causes for the decline in mortality rates include earlier detection of and improvements in treatment for breast cancer. (Wingo et al., 1998)

Because the cause of most breast cancer is unknown and the known risk factors are not easy to modify, the best strategy for prevention of breast cancer mortality is early detection and treatment. Regular breast cancer screening with mammography and clinical breast exam reduces the number of deaths from breast cancer for women between 50 and 69 years. (NCI, 1999) Experts disagree on the benefits of mammography screening for women under 50 years old or older than 69 years. In spite of these disagreements, the American Cancer Society recommends clinical breast exam and mammography every year for women beginning at age 40. (ACS 1999) The National Cancer Institute recommends clinical breast exam and mammography every one to two years beginning at age 40. (NCI, 1999) Data from the Washington State Behavioral Risk Factor Surveillance System[1] indicate that in 1997, approximately 53% of women in Washington age 40 and older reported having a mammogram in the past year. Approximately 69% reported having a mammogram within the last two years. Approximately 62% and 78% of women age 40 and older reported having a clinical breast exam in the past one and two years, respectively. While evidence about the value of self-breast exam for reducing mortality from breast cancer is inconclusive (NCI, 1999), the American Cancer Society recommends monthly self-breast exams beginning at age 20. (ACS, 1999)

2 3,472 new cases of prostate gland cancer were reported in 1997, making prostate cancer the most commonly reported malignancy among men. It was the second leading cause of cancer death among men, killing 590 men in 1997. Nationally, incidence rates for prostate cancer decreased between 1992 and 1996, and mortality rates decreased between 1990 and 1996. (Wingo et al., 1999) These trends are also apparent in Washington, although the decrease in prostate cancer incidence seems to have leveled off in more recent years. The reasons for the national decreases are not clear. The national decrease in incidence may be the result of changes in screening practices in the late 1980s and early 1990s (i.e., the introduction of screening into an unscreened population in the late 1980s followed by a decline in screening in the 1990s). (Wingo et al., 1998) No effective means are currently available to prevent the development of prostate cancer. While the American Cancer Society recommends annual screening for early detection of prostate cancer beginning at age 50 (ACS, 1999), prostate cancer screening has not demonstrated a clear benefit in reducing mortality. (NCI, 1999)

3 3,426 new cases of lung cancer were reported for 1997. 2,860 Washingtonians died of lung cancer, making it the leading cause of cancer mortality. Nationally, lung cancer incidence and mortality are decreasing for men and increasing for women, although the increase for women is not statistically significant. (Wingo et al., 1999) Washington data reflect this pattern for men. The pattern for women in Washington between 1992 and 1995 reflects the national increase. This increase is not apparent for 1996 and 1997. Additional years of data are needed to determine whether the rates for 1996 and 1997 will continue to be lower than the peak rates seen for women in 1995.

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[1] The Behavioral Risk Factor Surveillance System is a telephone survey of English speaking Washington residents.

Cigarette smoking is by far the most important cause of lung cancer. Nationally, approximately 90% of male and 72% of female lung cancer deaths are attributed to smoking. (CDC, 1997) Studies provide no evidence that screening can reduce mortality. (NCI 1999) Reduction in smoking remains the major focus of efforts to prevent lung cancer.

4 2,811 new cases of colon and rectal cancer were reported in 1997. Colorectal cancer was the state's second leading cause of cancer death, resulting in the loss of 957 lives in 1997. Nationally, the incidence rate for colorectal cancer decreased between 1985 and 1996. The national mortality rate has been decreasing since 1978 for men and since the late 1940s for women. (Wingo et al. 1999) Between 1992 and 1997 in Washington state, the largest decrease has been a non-statistically significant decrease in incidence of 3% per year among people in their 50s. For mortality, there has been a statistically significant decrease of 3% per year among people ages 70 years and older. Changes in screening, treatment, and lifestyle may be contributing to this decrease. (Wingo et al., 1998)

The National Cancer Institute concludes that screening of the stool for invisible amounts of blood (fecal occult blood test) every year or every two years beginning at age 50 reduces death from cancer of the colon and rectum. The National Cancer Institute also concludes that regular visual examination of the lower bowel (sigmoidoscopy) beginning at age 50 may reduce mortality from colorectal cancer. The National Cancer Institute does not believe that there is sufficient evidence to determine how often people should have sigmoidoscopies. (NCI 1999) The American Cancer Society recommends yearly fecal occult blood tests and sigmoidoscopy every five years beginning at age 50. Data from the Washington State Behavioral Risk Factor Surveillance System[2] indicate that in 1997, approximately 24% of Washingtonians age 50 and older reported having a fecal occult blood test in the past year. Approximately 33% reported having a fecal occult blood test within the last two years. Approximately 30% of Washingtonians age 50 and older reported having a sigmoidoscopy within the five years.

Research indicates that diets high in fat increase the risk for colon and rectal cancer and that diets high in fiber and micronutrients may lower risk. (NCI 1999) Based on these findings, the American Cancer Society recommends a diet that includes at least five servings of fruit and vegetables every day and six servings of foods from other plant sources, such as grain products, rice or beans. (ACS 1999) Regular physical activity may also reduce the risk for colon and rectal cancer. (ACS, 1999) Heavy use of alcohol and smoking may increase the risk of colorectal cancer. (NCI, 1999)

5 1,552 new cases of melanoma of the skin were reported in 1997. Melanoma accounted for 176 deaths in Washington residents. Nationally, the incidence rate of melanoma has been increasing. (Wingo et al., 1999) Since 1992, the rate of new cases of melanoma has increased an average of approximately 5% per year among Washington residents. The mortality rate in Washington from 1991 to 1997 has remained constant, consistent with the national pattern.

There is evidence that avoiding sunburns, especially during childhood and adolescence, may be effective in preventing melanoma. (NCI, 1999) Since some studies suggest that

[2] The Behavioral Risk Factor Surveillance System is a telephone survey of English speaking Washington residents.

sunscreens do not protect against melanoma (they do protect against other types of skin cancer) (NCI 1999), avoiding exposure to the sun through other methods, such as wearing protective clothing, may be important in decreasing risk for melanoma. Although the National Cancer Institute concludes that there is insufficient evidence that routine examination of the skin is effective in reducing mortality from melanoma, the Institute notes several instances where vigorous public and professional education programs resulted in detection of melanoma at earlier stages of disease and improved survival. (NCI, 1999)

The American Cancer Society recommends skin examination by a doctor every three years for people 20 to 40 years old and every year for people older than 40 years. The American Cancer Society also recommends monthly self-examination and provides guidelines for recognizing signs of the disease. These include moles that are asymmetrical (that is, one side does not match the other), have irregular borders (that is, the edges of the mole are ragged or notched); have more than one color or shade; or are larger than about ¼ inch across. A change in the in size, shape or color of a mole may also be a sign of melanoma. (ACS, 1999)

Washington State Cancer Registry

Background

In 1990, RCW 70.54.230 made cancer a reportable condition in Washington and mandated the Department of Health to establish a statewide cancer registry program. Under this mandate, the Department established the Washington State Cancer Registry (WSCR) in 1991. The registry is dedicated to fulfillment of the legislative intent "...to establish a system to accurately monitor the incidence of cancer in the state of Washington for the purposes of understanding, controlling, and reducing the occurrence of cancer in this state." Since 1994, funding for WSCR has been provided, in part, through the Centers for Disease Control and Prevention's National Program of Central Cancer Registries. This program is designed to standardize data collection and provide information for cancer prevention and control programs at the local, state, and national levels.

Data Collection

Cancer cases are collected through a combination of contracts with two regional cancer registries and cases from independent reporting facilities (such as hospitals and clinics) with in-house cancer registry programs. The contractors and reporting facilities are responsible for case-finding, abstracting information on cancer from medical sources, and reporting cases to the statewide registry. The Cancer Surveillance System (CSS) of the Fred Hutchinson Cancer Research Center provides data on cancer cases from 13 counties in Western Washington, covering the majority of the state's population including the largest urban center of Seattle. CSS has been in operation since 1974 as a participant in the Surveillance Epidemiology and End-Results (SEER) Program of the National Cancer Institute.

The remainder of the state is covered by reporting facilities with in-house cancer registry programs and the Walla Walla-based Blue Mountain Oncology Program (BMOP). BMOP is a consortium of 14 hospital-based cancer registries and provides the state with data from hospitals in the Walla Walla, Tri-Cities and Spokane areas. In addition, under contract to the Department of Health, BMOP provides staff to collect cases at facilities that do not have in-house cancer registries. WSCR also conducts regular data exchanges with state cancer

registries in Oregon and Idaho to gather data on Washington residents traveling across state lines for cancer diagnosis and treatment.

Cancer cases are identified through reports from hospitals, pathology laboratories, radiation oncology centers, ambulatory surgical centers, cancer treatment centers, and physicians. Once the case is identified, an abstract of cancer information is completed within 6 months and quality assurance activities are carried out by the contractors and reporting facilities. Data files are transmitted from the contractors and reporting facilities to the state on a regular basis. WSCR is responsible for merging the data and finalizing the statewide data set, overall data quality assurance in accordance with national standards, and dissemination of cancer information to assist with cancer prevention and control efforts statewide.

The cancer reporting rules (246-430 WAC) define reportable cancers as "any malignant neoplasm, with the exception of basal and squamous cell carcinoma of the skin". Also specifically included are: 1) basal and squamous cell carcinoma of the external genital organs (vulva, labia, clitoris, prepuce, penis, anus, scrotum); 2) all brain tumors; 3) ovarian tumors of borderline or low malignant potential and 4) cancer in situ, except cancer in situ of the uterine cervix. The legally required data for cancer reporting include patient demographics (such as age and sex) and medical information (such as type of cancer and date and stage at diagnosis) for all newly diagnosed cancers. Copies of Washington's cancer reporting legislation and regulations are available on request.

Report Contents

The first set of data in this report summarizes incidence and mortality for all cancers combined and for the 24 cancer sites most frequently diagnosed in Washington residents. New for 1997 is a second data section that summarizes cancer incidence and mortality by race. Each of these sections begins by showing the distribution of diagnoses and deaths for the most common cancer sites. These charts are followed by information on each of the selected malignancies. Finally, appendices include technical notes and sources of information on the epidemiology and prevention of cancer.

The primary focus of this report is on cases newly diagnosed between January 1, 1997 and December 31, 1997. This information covers the entire state and also includes new cases of cancer among Washington residents diagnosed in Oregon and Idaho. Mortality statistics include deaths among Washington residents that occurred in 1997 where the underlying cause of death was cancer. The cancer may have been diagnosed before 1997.

The following material briefly describes the tables, graphs and charts in this report; the statistical methods used to produce each table, graph or chart; and special considerations for interpreting the data.

Tables, Charts and Graphs

Data Definitions and Sources

The Washington State Cancer Registry provides the number of new cases (incidence) of cancer as described above. Based on estimates of the expected number of cancer cases, the registry includes more than 95% of cases. Each cancer is coded to an International Classification of Diseases Oncology (ICD-O) code. The data definition provides the ICD-O codes used in each section. We have used definitions that are consistent with those used by the National Cancer Institute's SEER program.

The Washington State Department of Health, Center for Health Statistics provides information on the number and causes of death from death certificates. According to the National Center for Health Statistics, more than 99% of all deaths occurring in the United States are registered in the death certificate system. Accuracy of reporting specific causes of death varies since classification of disease conditions is a medical-legal opinion subject to the best information available to the physician, medical examiner, or coroner certifying the cause of death. We obtained the number of cancer deaths from the Vital Registration System Annual Statistical Files, Washington State Deaths 1980-1997 CD-ROM issued October 1998.

The underlying cause of death is coded to an International Classification of Diseases, 9th Revision (ICD-9) code. The data definition provides the ICD-9 codes used in each section. We have used definitions that are consistent with those used by the SEER program. **For some cancer sites, including colorectal, liver, breast, and multiple myeloma, the SEER coding differs from the National Center for Health Statistics coding which may be used in other Department of Health reports.** Therefore, before comparing information from different reports, one must be sure that the definitions are consistent.

We obtained population estimates necessary for the calculation of rates from the Washington State Department of Social and Health Services, Research and Data Analysis. These estimates, called Washington State adjusted population estimates, were released in April 1999 and are based on estimates by Claritas, Inc. and the Washington State Office of Financial Management.

Incidence and Mortality Summary

These tables provide the number of new cases and the number of deaths for Washington State residents in 1997. Since the numbers of new cases and deaths depend, in part, on the size of the population, we converted numbers to rates (e.g., the number of cases per 100,000 people) so that they may be compared among different regions or populations. For diseases, such as cancer, where incidence varies with age, the rates are usually age-adjusted to minimize the effect of differing age distributions when comparing two geographic regions or populations.

Following National Cancer Institute guidelines, we have adjusted rates to the US 1970 standard population. **When making comparisons, one must be careful to compare age-adjusted rates that are adjusted to the same standard population.** Age-adjusted rates should not be compared to rates which are not age-adjusted (i.e., crude rates). Detail on our age-adjustment method is provided in Appendix A.

The final row of the incidence tables provides age-adjusted incidence rates from the eleven National Cancer Institute's SEER regions. These rates are from SEER*Stat version 2.0 CD-ROM public-use file from August 1998 for 1992-1996 data. The final row of the mortality tables provides age-adjusted mortality rates for the United States. The US mortality data were obtained from the SEER CanQues program (**http://www-seer.ims.nci.nih.gov/ScientificSystems/Canques1973_1996/**). The SEER programs do not include data for 1997. Since cancer incidence and mortality rates do not change rapidly, we have provided 1996 national data for comparison.

Stage at Diagnosis

Stage at diagnosis refers to how far a cancer has spread from its site of origin when it is diagnosed. The stages, in order of increasing spread, are in situ, local, regional and distant. Cancers staged as local, regional, or distant are referred to as invasive. The

WSCR data contain the stage of disease at diagnosis coded according to the SEER guidelines.

In Situ	A tumor that fulfills all microscopic criteria for malignancy, but does not invade or penetrate surrounding tissue.
Localized	A tumor that is invasive but remains restricted to the organ of origin.
Regional	A tumor that has spread by direct extension to immediately adjacent organs or tissues and/or metastasized (spread through the blood stream) to regional lymph nodes, but appears to have spread no further.
Distant	A tumor that has spread by direct extension beyond the immediately adjacent organs or tissues, and/or metastasized to distant lymph nodes or other distant tissues.
Unstaged	Insufficient information available to determine the stage of disease at diagnosis.

We have provided the frequency distribution of cases according to their stage at diagnosis.

For most cancers, diagnosis at an early stage (in situ or local) results in improved survival. One standard measure of survival is the five-year survival rate that estimates the proportion of individuals with a given cancer who are living five years after diagnosis. Due to the relative newness of WSCR, we have not developed five-year survival rates for Washington state residents. However, we have provided SEER five-year relative survival rates for each cancer. These statistics were obtained from SEER*Stat version 2.0 CD-ROM public-use file from August 1998 for 1992-1996 data. This data file provides relative survival rate by stage of disease at diagnosis. The national five-year relative survival rates are calculated for cancer cases diagnosed between 1992 and 1995, based on follow-up of patients through 1996. The National Cancer Institute defines the relative five-year survival rate as the likelihood that a patient will not die from causes associated with their cancer within five years. The SEER*Stat program calculates this rate using a procedure described by Ederer, Axtell, and Cutler (1961) whereby the observed survival rate is adjusted for expected mortality. It is always larger than the observed survival rate. (Ries et al., 1999)

Age-Specific Incidence Rates

Age-specific rates show the variation in cancer incidence by age group for males, females, and the total population.

Incidence and Mortality Rate Trends

These charts provide incidence and mortality rates for several years for Washington residents per 100,000 population, age-adjusted to the US 1970 standard population. (See “Incidence and Mortality Summary” for a discussion of age-adjusted rates.) These tables show both how the rates vary over time and the relationship between cancer incidence and mortality.

Incidence and Mortality Rates by County

We have presented the average annual age-adjusted cancer incidence and mortality rates for Washington residents per 100,000 population by county. (See “Incidence and Mortality Summary” for a discussion of age-adjusted rates.) Because of the small size of many

counties and the relative rarity of some types of cancer, the incidence and mortality rates based on one year of data are not stable (i.e., there is some natural fluctuation in rates from year to year). Therefore, for county rates, we have combined three years of data (1995-1997) to compute average annual age-adjusted rates for the three-year period.

The state rates and 95% confidence intervals are included for comparison purposes. While the incidence and death statistics in this report are not subject to sampling error, they may be affected by random variation. The confidence interval is used to describe the range of that variation.

Generally, when the confidence interval for the area of interest does not overlap with the confidence interval for the comparison area, we say that the two areas are statistically significantly different, i.e., the difference between the two rates is more than that expected by random variation or chance. However, if we are making many comparisons, we may still find statistically significant differences just by chance. In fact, with a 95% confidence interval, we expect that 5% of the comparisons will be statistically significant by chance. Thus, with 39 counties and 24 cancer sites, we might see as many as 45 instances where the rate for a county is statistically significantly different from the state rate just by chance.

Even with a three-year average, rates may fluctuate widely when there are a small number of cases. Therefore, we omit the rate and confidence intervals when there are 5 or fewer cases for the three-year period. Details of our methods for calculating confidence intervals are in Appendix A.

County Data Tables

We have included tables with county data following the sections on the 24 cancer sites. Each table provides the average annual number of new cases and the average annual number of deaths for 1995-1997. These numbers are the total number of new cancers or the total number of deaths for the three-year period divided by three. The table also includes incidence and mortality rates with the 95% confidence interval, age-adjusted to both the 1940 and 1970 US standard populations. (See “Incidence and Mortality Summary” for a discussion of age-adjusted rates. See “Incidence and Mortality Rates by County” for a discussion of confidence intervals.) Age-adjustment using these standards is included so that the rates are comparable to those from the National Cancer Institute, which adjusts to the 1970 US standard population and to those from the National Center for Health Statistics at CDC which generally adjusts to the 1940 US standard population. However, caution must be used in making comparisons among different sources, since coding of cancer sites varies. In particular, we have noted that the National Cancer Institute and the National Center for Health Statistics use different codes for colorectal, liver, breast, and multiple myeloma.

Cancer by Race

Background

The cancer reporting rules require that the race and ethnicity of each case be included in the data provided to WSCR. Following national standards of the Office of Management and Budget, races include American Indian and Alaska Native, Asian and Pacific Islander (API), African-American or black, and Caucasian or white. Ethnicity is Hispanic or non-Hispanic.

In interpreting data by racial and ethnic group, it is important to remember that the standard racial and ethnic groupings are broad categories that for the most part do not reflect a

homogenous group of people. Important differences exist within groups based on genetic predisposition and cultural heterogeneity. Some of the cultural heterogeneity results from people of diverse cultural backgrounds being classified as one racial group. Other reasons for heterogeneity within one racial or ethnic group that may be particularly important in Washington include differences in length of time in the United States and regional differences within the United States that are reflected in people who move to Washington.

In spite of the heterogeneity among people in one racial or ethnic group, reporting cancer incidence by racial and ethnic group is desirable because different groups have different patterns of cancer incidence and mortality. Many people and organizations involved in reducing incidence and death from cancer provide outreach to specific racial and ethnic groups and so knowledge of what may be most important for those groups will help them in their work. Additionally, the federal Healthy People 2010 initiative outlines the goal of reducing health disparities among racial and ethnic groups. The Washington State Department of Health has adopted this goal as a priority. To determine whether disparities exist, we must first provide data by racial and ethnic group.

The reasons for differences by racial and ethnic group are often not clear. Some of these differences seem to be related to biological differences among racial groups. For example, as a group, whites have skin types that are more likely to develop melanoma compared to people of other races. Many of the differences seem to be related to lifestyle. For example, diet may play a role in the finding that Asians in the United States have higher rates of prostate cancer than Asians living in Asia. Differences in access to and acceptance of medical care, including screening for early detection and treatment and access to quality medical care, also seem to play a role. Differences in some of these factors may reflect other differences by racial and ethnic group, such as differences in employment rates, health insurance coverage and rates of poverty. In these instances, racial and ethnic groupings are, at best, poor proxy measures of more important factors for which we do not have information.

A study linking Indian Health Services data to WSCR revealed that American Indians are often reported as white and are, therefore, underreported in WSCR. (Sugarman et al., 1996) For people who died between 1992 and 1996, we compared reporting of race and ethnicity on the death certificate and in WSCR. Overall, racial classification agreed in the two sources for 98.6% of the records. However, there were marked differences by race. Approximately 99% of those recorded as white, 97% of those recorded as black, and 94% of those recorded as Asians and Pacific Islanders on the death certificate were recorded as such in WSCR. However, only approximately 70% of people recorded as American Indians and Native Alaskans on the death certificate were recorded as such in WSCR. Only 74.6% of people reported as Hispanics on the death certificate were recorded as such in WSCR.

Based on this analysis, we have concluded that the data in WSCR are of sufficient quality to report data by race for Asians and Pacific Islanders (API), blacks and whites. According to the 1990 US Census, APIs, blacks, and whites make up 4%, 3% and 89% of Washington's total population, respectively. The National Cancer Institute provides information separately for people of Chinese, Filipino, Hawaiian, Japanese, Korean and Vietnamese heritages. However, the current quality of data in WSCR do not allow this level of reporting. Therefore, following the US Office of Management and Budget recommendations, we have included these groups under the general classification of API. The API group includes the groups mentioned above, plus people from the Indian subcontinent and other people from all areas of southeast Asia and the Pacific Islands. According to 1990 US Census Bureau information, the largest API groups in Washington are Filipino (21% of all APIs), Japanese (16%), Chinese (16%), Korean (14%), and Vietnamese (9%).

The data in WSCR are not of sufficient quality to report information for American Indians and Hispanics. We will continue to try to improve reporting for American Indians and Hispanics with the goal of including this information in subsequent WSCR reports.

Leading Causes of Cancer by Race

We have included information on all cancer sites combined and 16 specific sites that include the 10 cancer sites most frequently diagnosed among APIs, blacks and whites. Cancer of the breast, prostate, lung, and colon and rectum are among the four most frequently diagnosed cancer sites for all three races. The fifth most commonly diagnosed cancer is stomach for APIs, non-Hodgkin's lymphoma for blacks and melanoma for whites. General information on the four most commonly diagnosed sites and melanoma is available beginning on page 3.

Breast Cancer (female)

From 1995 -1997, breast cancer was the most commonly diagnosed cancer among APIs and whites in Washington. It was the third most commonly diagnosed cancer among blacks. White women had the highest rates of breast cancer, followed by black and API women. Although from somewhat different time periods, this pattern is consistent with national figures for 1988 - 1992. Nationally, there were large differences within the API group. For the five largest API groups in Washington, national data showed all of these groups having rates of breast cancer that were lower than those of blacks and whites. However, women of Japanese and Filipino heritages had relatively high rates and women of Korean and Vietnamese heritages had relatively low rates. Women of Chinese heritage had rates in the middle. (Miller et al. 1996)

Nationally from 1988 -1992, black women had a lower incidence rate of invasive breast cancer and a higher mortality rate compared to whites. (Miller et al. 1996) This pattern is seen in the 1995 - 1997 Washington data and speaks to the need for outreach to blacks in Washington to improve rates of early detection and treatment.

Prostate Cancer

From 1995 -1997, prostate cancer was the most frequently diagnosed cancer among blacks in Washington. It was the second most commonly diagnosed cancer among whites and the fourth among APIs. Black men in Washington had the highest rates of both incidence and mortality from prostate cancer, followed by whites and APIs. Miller et al. (1996) note that blacks in the United States have the highest rates of prostate cancer in the world. They also note that part of the relatively low rate among APIs as a group is related to recent immigration of people from Asia, where rates of prostate cancer are much lower than in the United States. For the five largest API groups in Washington, national data from 1988 - 1992 indicated that men of Japanese heritage had the highest rates of prostate cancer, followed by men of Filipino, Chinese, Vietnamese and Korean heritages. (Miller et al. 1996)

Lung and Bronchus

From 1995 - 1997, lung cancer was the second most commonly diagnosed cancer among blacks in Washington. It was the third most commonly diagnosed cancer among APIs and whites. It was the leading cause of cancer death for all three groups. Overall, rates of lung cancer were highest for blacks, followed by whites and APIs.

For all three groups, there were large differences in incidence between men and women, with rates for men being between 1.5 and twice that of women. These differences most likely reflect historical smoking patterns. The relative rates among the three groups in Washington reflect the relative rates for men. Rates of lung cancer are similar among black

and white women. These rates are approximately two times the rate among API women. The same patterns are seen in the 1988 - 1992 national data. (Miller et al. 1996)

The 1988 - 1992 national data for the five largest API groups in Washington showed that men of Vietnamese heritage had the highest rates of lung cancer and men of Japanese heritage had the lowest. The rates for men of Filipino, Chinese and Korean heritages were similar and between those of Japanese and Vietnamese groups. Rates for all these groups were lower than rates for whites and blacks. Like men, national data for women showed that women of Vietnamese heritage had the highest rates of lung cancer among the five largest API groups in Washington. However, unlike men, the national data for women showed relatively low rates for women of Filipino, Japanese and Korean heritages. (Miller et al. 1996)

Colon and Rectum

From 1995 - 1997, colorectal cancer was the second leading cause of cancer among APIs in Washington and the fourth leading cause for blacks and whites. However, similar to the national pattern (Miller et al. 1996), blacks in Washington had the highest incidence and death from colorectal, followed by whites and APIs.

Nationally, variation within the API group is important. From 1988 - 1992, men of Japanese heritage had a higher incidence rate of colorectal cancer compared to black men. The incidence rate of colorectal cancer for women of Japanese heritage was between that of black and white women. People of Filipino, Korean and Vietnamese heritages had the lowest rates. The rate for people of Chinese heritage was lower than rates for whites and Japanese, but higher than rates for the other API groups. (Miller et al. 1996) Some of these differences within the API group may reflect the proportion of people in the different groups who are born outside of the United States. According to Miller et al. (1996), "Migrants to the United States (from Japan and other countries where rates of colon and rectum cancer are lower than in the U.S.) have higher rates than do those who remain in their native countries. Studies have shown that first and second generation American offspring from these migrant groups develop these cancers at rates reaching or exceeding those of the United States white population." (p.42)

Stomach

From 1995 - 1997, stomach cancer was the fifth leading cause of cancer and the fourth leading cause of cancer deaths among APIs in Washington. It was the 10th leading cause of cancer among blacks in Washington and the 14th among whites. The incidence and mortality rates reflect this distribution with highest rates for APIs, followed by blacks and whites. These patterns are similar to national patterns from 1988 - 1992. (Miller et al. 1996)

National data for 1988 - 1992 showed large differences in the incidence of stomach cancer within the API group. Additionally, the ratio of male to female cases differed for different API groups. For people of Vietnamese and Filipino heritages, incidence rates for men and women are similar. For people of Chinese, Japanese and Korean heritages, rates for men are approximately twice those for women. For men, people of Korean heritage had the highest incidence rates between 1988 and 1992. For women, rates were highest among people of Vietnamese heritage. Rates were lowest among both men and women of Filipino heritage. (Miller et al. 1996)

Infection with helicobacter pylori has been associated with increased risk for stomach cancer. However, the National Cancer Institute believes that there is insufficient evidence to conclude that eradication of helicobacter pylori decreases risk for stomach cancer. (NCI 1999) Diets high in pickled, smoked and salted foods and low in fresh fruits and vegetables are also associated with increased risk of stomach cancer. However, the specific dietary

components influencing the risk of developing stomach cancer have not been clearly delineated. (NCI 1999)

In Japan, where stomach cancer is about five times more common than in the United States, improved survival after a diagnosis of stomach cancer has been attributed to mass screening programs for early detection and treatment. While it is not clear that this approach is useful in the United States, some populations at increased risk for stomach cancer may benefit from screening. These populations include immigrants from countries with high rates of stomach cancer. Among the groups covered in this report, the NCI specifically notes high rates of stomach cancer in Japan, China and Korea. (NCI 1999)

Non-Hodgkin's Lymphoma

From 1995 - 1997, non-Hodgkin's lymphoma (NHL) was the fifth leading cause of cancer among blacks, the sixth leading cause among APIs and the seventh leading cause among whites in Washington state. Nationally from 1988 - 1992, whites had higher incidence and mortality rates of NHL than blacks. (Miller et al. 1996) In Washington, relatively few black people develop NHL, even though it is the fifth leading cause of cancer among blacks in Washington. With small numbers, it is difficult to determine whether rates for whites are higher than for blacks, or whether the rates are comparable.

APIs in Washington have a lower incidence rate of NHL compared to whites. Nationally, from 1988 - 1992 there were differences within the API group. People of Korean heritage had relatively low rates compared to people of Vietnamese, Japanese, Chinese and Filipino heritages. (Miller et al. 1996)

Factors associated with increased risk of NHL include exposure to ionizing radiation; chemicals in the environment, such as benzene and some types of pesticides; chemotherapy or radiation treatment for other forms of cancer; and some infectious agents, such as the human immunodeficiency virus (HIV) which causes AIDS. However, most people with NHL do not have any of these risk factors and the cause of the disease is unknown. (ACS 1999).

Melanoma

From 1995 - 1997 melanoma was the fifth leading cause of cancer among whites in Washington. While APIs and blacks are diagnosed with melanoma at much lower rates than whites, people of all races may get melanoma and so it is important for everyone to recognize the signs of this disease. More detail on melanoma is presented on page 5 of this report.

Tables, Charts and Graphs by Site for Asians and Pacific Islanders, Blacks, and Whites

This portion of the report contains data on all cancers combined and on the 10 most frequently diagnosed cancer sites for APIs, blacks and whites, resulting in 16 separate sites. The number of API and black residents in Washington is relatively small and the some types of cancer are not very common. With relatively small numbers, there is often year to year variation in rates that appears to be random. To minimize the impact of this variation, we have combined data for 1995 - 1997 for this section of the report. Additional information on data sources, definitions, and technical notes, applicable to race-specific tables, charts and graphs included in this report, is provided on pages 7-10. Special attention should be given to the technical notes for county data, which cover many points related to small numbers and confidence intervals.

As in the previous tables, we have not calculated rates and confidence intervals if there are five or fewer cancers for the three-year period. Additionally, we have not presented stage at diagnosis information when there are 15 or fewer cases for the three-year period.

What's Missing

Information on Prevention, Early Detection, and Treatment

Illness and death due to cancer are increasingly preventable through the application of growing knowledge about the causes of cancer, improved screening, and early diagnosis techniques, and more effective treatment. Extensive information on prevention though changing modifiable risk factors, early detection through routine screening, and preferred treatment modalities is available. We have not attempted to reproduce this information in detail. However, a brief summary of the most important public health aspects of cancer prevention and control follows in the paragraphs below. We have provided a resource list in Appendix B for those interested in more detail.

Screening for early detection has a clear role in reducing the disease burden due to cancer of the female breast, the uterine cervix, and colorectal cancer (NCI, 1999). There is also evidence that routine examination of the skin may be effective in reducing mortality from melanoma. (NCI, 1999) Inspection of the oral cavity by dentists and physicians may help identify oral cancers at earlier, more treatable stages, but there is not current evidence that routine screening results in decreased mortality from oral cancer. (NCI 1999)

Major reductions in cancer rates, and in an individual's likelihood of developing cancer, are achievable through primary prevention strategies. The elimination of tobacco use would markedly reduce the incidence of lung cancer and reduce the incidences of cancer of the oral cavity and pharynx, esophagus, bladder, kidney, pancreas, colon, and rectum. (Schottenfeld and Fraumeni, 1996; NCI, 1999) Cancers of other sites, especially those of squamous cells, such as squamous cell cancer of the uterine cervix, may also be reduced by elimination of tobacco use. (Schottenfeld and Fraumeni, 1996). A diet low in fat, including five or more servings per day of fruits and vegetables, is likely to reduce the risk for cancer of the colon and rectum, oral cavity, esophagus, and stomach (Schottenfeld and Fraumeni, 1996) and possibly reduce the risk of breast cancer (NCI, 1999). Additional studies have shown beneficial effects of a diet rich in fruits and vegetables for prevention of cancer at other sites, such as uterine cervix, ovary, endometrium, lung, larynx, and other organs, but the scientific literature for these sites is not as extensive and/or consistent as for the sites previously listed. (Schottenfeld and Fraumeni, 1996) Regular, moderate exercise has also been shown to have some benefit in the prevention of cancer at a number of sites, such as colorectal and breast (NCI, 1999). The overall health benefit of these habits, and their lack of countervailing risk, makes them wise choices for cancer prevention. Health care providers, public health agencies, and voluntary organizations can provide the education that helps people make healthy choices.

While individual behavior plays an important role in cancer prevention, governmental and other societal entities have key roles as well. Policies and regulations that, for example, ban cigarette smoking, reduce youth access to tobacco, assure delivery of health services and control occupational exposures are important for preventing and controlling cancer.

References

American Cancer Society. Cancer Information: Specific Cancers (http://www2.cancer.org/crcGateway/index.cfm). August 1999.

Centers for Disease Control and Prevention, Office on Smoking and Health. Smoking Attributable Morbidity and Mortality and Economic Costs version 3.0 (SAMMEC 3.0.). 1997.

Centers for Disease Control and Prevention. Colorectal Cancer: The Importance of Early Detection. At-A-Glance. 1996

Miller BA, Kolonel LN, Bernstein L, Young, Jr. JL, Swanson GM, West D, Key CR, Liff LM, Glover CS, Alexander GA, et al (eds). *Racial/Ethnic Patterns of Cancer in the United States 1988-1992*, National Cancer Institute. NIH pub. No. 96-4104. Bethesda, MD, 1996.

National Cancer Institute. PDQ Detection and Prevention website (http://cancernet.nci.nih.gov/). August 1999.

Ries LAG, Kosary CL, Hankey BF, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996, National Cancer Institute, Bethesda, MD, 1999.

Schottenfeld D and Fraumeni, Jr JF. *Cancer Epidemiology and Prevention, Second Ed.* Oxford University Press, 1996.

Sugarman JR, Holliday M, Ross A, Castorina J, Hui Y: *Improving AI/AN Cancer Data in the Washington State Cancer Registry Using Linkages with the Indian Health Service and Tribal Records*. Presented at the Native American Cancer Conference II: Risk Factors, Outreach and Intervention Strategies, Seattle, WA, June 16-19, 1995. ©American Cancer Society 1996.

Wingo PA, Ries LAG, Rosenberg HM, Miller DS, Edwards BK. Cancer Incidence and Mortality, 1973-1995. *Cancer* 82:1197-207, 1998.

Wingo PA, Ries LAG, Giovino GA, Miller DS, Rosenberg HM, Shopland DR, Thun MJ and Edwards BK. Annual report to the nation on the status of cancer, 1973-1996, with a special section on lung cancer and tobacco smoking. *Journal of the National Cancer Institute* 91:675-689, 1999.

Appendices

Appendix A: Technical Notes

Appendix B: Sources of Additional Information

Appendix C: Advisory Council Members

Appendix D: Washington State Cancer Registry Contacts

Appendix A: Technical Notes

Age-Adjustment

Age-adjusted incidence rates were developed using the direct method. They were standardized to the age distribution of the United States 1970 and 1940 populations. Following the age-adjustment procedures used by the National Cancer Institute, which uses the US 1970 standard population for age-adjustment, we used five year age groups in calculating age-adjusted rates with the 1970 US standard population. For age-adjustment with the 1940 US standard population, we followed the methods of the National Center for Health Statistics which uses 10 year age groups from age 5 through 85. The age distributions of the US standard populations are shown below.

US Standard Population Proportions

1970		1940	
age group	proportion	age group	proportion
0 - 4	0.0844	<1	0.0160
5 - 9	0.0982	1 - 4	0.0641
10 - 14	0.1023	5 - 14	0.1703
15 - 19	0.0938	15 - 24	0.1817
20 - 24	0.0806	25 - 34	0.1621
25 - 29	0.0663	35 - 44	0.1392
30 - 34	0.0562	45 - 54	0.1178
35 - 39	0.0547	55 - 64	0.0803
40 - 44	0.0590	65 - 74	0.0484
45 - 49	0.0596	75 - 84	0.0173
50 - 54	0.0546	85+	0.0028
55 - 59	0.0491		
60 - 64	0.0424		
65 - 69	0.0344		
70 - 74	0.0268		
75 - 79	0.0189		
80 - 84	0.0112		
85+	0.0074		

Direct method of age adjustment

Multiply the age-specific rates in the target population by the age distribution of the standard population.

$$\hat{R} = \sum_{i=1}^{m} s_i (d_i / P_i) \; = \sum_{i=1}^{m} w_i d_i$$

Where m is the number of age groups, d_i is the number of deaths in age group i, P_i is the population in age group i, and s_i is the proportion of the standard population in age group i. This is a weighted sum of Poisson random variables, with the weights being $\left(s_i / P_i\right)$.

Confidence Intervals

Confidence intervals for the age-adjusted rates were calculated with a method based on the gamma distribution (Fay and Feuer, 1997). This method produces valid confidence intervals even when the number of cases is very small. When the number of cases is large the confidence intervals produced with the gamma method are equivalent to those produced with the more traditional methods, as described by Chiang (1961) and Brillinger (1986). The formulas for computing the confidence intervals are given below. Although the derivation of this method is based on the gamma distribution, the relationship between the gamma and Chi-squared distributions allows the formulas to be expressed in terms of quantiles of the Chi-squared distribution, which can be more convenient for computation.

$$\text{Lower Limit} = \frac{v}{2y}\left(\chi^2\right)^{-1}_{\frac{2y^2}{v}}(\alpha/2)$$

$$\text{Upper Limit} = \frac{v + w_M^2}{2(y + w_M)}\left(\chi^2\right)^{-1}_{\frac{2(y+w_M)^2}{v+w_M^2}}(1-\alpha/2)$$

where y is the age-adjusted death rate, v is the variance as calculated as shown below, w_M is the maximum of the weights $s_i P_i$, $1-\alpha$ is the confidence level desired (e.g., for 95% confidence intervals, α = 0.05), and $\left(\chi^2\right)^{-1}_x$ is the inverse of the χ^2 distribution with x degrees of freedom.

$$v = \sum_{i=1}^{m} d_i\left(s_i/P_i\right)^2$$

References

Brillinger, D. R. The natural variability of vital rates and associated statistics [with discussion]. *Biometrics* 42:693-734, 1986.

Chiang, C. L. Standard error of the age-adjusted death rate. *Vital Statistics, Special Reports* 47:271-285, USDHEW, 1961.

Fay, M.P. and Feuer, E.J. Confidence intervals for directly rates: a method based on the gamma distribution. *Stat Med*16:791-801, 1997

Appendix B: Sources of Additional Information

For more information on cancer, risk factors or prevention strategies please refer to the following resources:

1-800-4CANCER: A cancer information service of the National Cancer Institute

American Cancer Society, Western-Pacific Division: 1-800-729-1151 ext. 3307
American Cancer Society. 1998 Cancer Facts and Figures
American Cancer Society website, http://www.cancer.org/frames.html

National Cancer Institute. PDQ Detection and Prevention Website
http://icicc.nci.nih.gov/clinpdq/screening.html

Schottenfeld, David and Fraumeni, Joseph F. Jr. Cancer Epidemiology and Prevention, Second Ed. Oxford University Press, 1996.

Washington State Department of Health. Health of Washington State. September 1996.

Appendix C: Advisory Council Members

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Joan Craig, MD	Oncologist
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Dane Moseson, MD, FACS	American College of Surgeons
Beth Mueller, DrPH	Cancer Surveillance System of the Fred Hutchinson Cancer Research Center
Kay Musgrove, RN	Cancer survivor
Elizabeth Nucci	Washington State Hospital Association
Tana Olson, CTR	Washington State Tumor Registrars Association
Mary Potts, RRA, CPA, CTR	Cancer Surveillance System of the Fred Hutchinson Cancer Research Center
Patti Miglion	Western Pacific Division, American Cancer Society
Brent Reeves, MD	Madigan Army Medical Center
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